



 INTRODUCTION

The Royal Society offer their partnership grants of up to £3000 to primary or secondary schools to work in partnership with a scientist or an engineer to make those extra special teaching ideas come to fruition.

There are many examples of the big success of this scheme; here are a few that caught our attention.



## Beetle-Mania

Think back to your playground at primary school, all that really mattered then was who your best friend was, and who you were going to play with.

Well times have changed. **Anne Sweeney**, who teaches Year 4 (aged 8-9) at Herries School in Cookham Dean, Berkshire tells us that her pupils use their playground for a spot of research.



Back in 2001, [Herries School](#) were awarded their first Royal Society Partnership Grant to study the microclimates in the school grounds.

This got the students thinking about the conditions in the different areas of the school, and how this would attract species who liked that particular habitat.

Then a few stag beetles were found walking in the playground, minding their own business, as the kids went out to play...

Anne and her class wanted to study these, the largest beetles of Britain, which are becoming endangered.

This is just what they did, with the help of another two Partnership Grants, and a PhD student, Deborah Harvey.

Sponsored by Royal Holloway, University of London and The People's Trust for Endangered Species, Deborah needed help with her stag beetle count.

Stag beetles lay their eggs in dead, decaying wood (since it's nice and soft). The larvae hatch, live and feed on rotting wood underground for around 5-7 years.

This was going to be one long science project, involving real-time research, to help find out why one of Britain's largest beetle species is slowly dying out.

Deborah visited the school with a beetle and a grub, talked to the children and looked round the Herries School grounds.

The work the students had already done on microclimates helped with deciding where to put log piles to attract stag beetles.

So Deborah and Anne's class chose two sites where the beetles were most likely to want to set up camp.

The pupils got to work building two contrasting log-piles on these sites in the hope that female beetles would lay their eggs in them.

The log-piles were not to be disturbed or else they risked killing the very creatures they were trying to preserve. This was exciting stuff, and the local paper even ran a feature on it.

The children asked questions such as:

What sort of wood do stag beetles like best?

Do they like sunny or shady places?

Are they like frogs, needing damp places?

Will the sound of children playing scare them away?

Do they like smells (in the way some insects like flower smells)?

The first log-pile was made of ash in varying states of decay, at the top of the playground, and the other had a variety of different woods which were felled the year before, at the bottom of the playground. A data logger was used to record the conditions of both log-piles i.e. temperature, light, sound and humidity.

All the data was logged by the eager young scientists, recorded onto a computer spreadsheet, and converted into a spreadsheet. Yes, we're talking 8 and 9 year olds, not university students. Deborah supplied an experimental nesting box for log-pile 1 too. Using prompt sheets they also interpreted what they saw.



The children worked with Deborah to see if her newly designed trap would work. They caught stag beetles and recorded their size, sex and where they were found. To mark each stag beetle so one individual could be recognised from another, that stationery essential – Tippex - was used.

Results for the temperature, humidity, light and noise levels in the nesting box were that they didn't fluctuate the way they did on the log-piles. Even the noise of playtime was drowned out in the box. The students waited to see whether the beetles would breed in the log-piles or nesting box.

Teacher Anne Sweeney said *"It really isn't a lot of extra work. Year 4 children study 'habitats' as part of the national curriculum. This project covers that unit, but goes way beyond the QCA requirements, inspiring the whole school and the wider community in the search for Stag Beetles. However, it is essentially a simple project which any school could easily adopt without a lot of extra work for the teachers."*

Later in the year, the children noticed that the log-piles were sprouting lots of fungi. They wanted to know whether or not Stag Beetles were attracted to logs with a particular fungus on them.

Log-pile 1 had a huge variety of fungi, but log-pile 2 had some spectacularly large ones (not edible mind you, and remember to wash your hands!). Each student was responsible for taking a weekly picture of a particular log (using a digital camera, which only the Royal Society Partnership Grant could have allowed).

However it was still not clear which log-pile the stag beetles liked, as there were very few sightings on the piles themselves. Children found beetles all over the playground, and dead ones (victims of ravenous magpies, or was it the attractive shininess of their shells?) were nearest log-pile 2. This was not very helpful as there was no way of knowing where they were when the magpies found them.

But then in 2004, it all went belly-up. Extension work to the school hall meant that log-pile 1 was seriously disturbed because of builders' rubbish thrown on it. The nesting box was crushed. As were the students hopes.

The box had to be re-made, and Anne and the students realised that they would need to continue the experiment in more than one area.

This mirrors the rollercoaster journey that grown up scientists go through when they're doing 'real science'. Exciting, yet unpredictable.

The People's Trust for Endangered Species was running a national programme to 'Bury a Bucket for Beetles'. Anne applied for another Royal Society Partnership Grant to fund 32 'beetle buckets' which were to be distributed to local schools and homes.

During National Science Week in 2005, they launched their 'beetle bucket' project.

The children buried buckets in the grounds, the Marsh Meadow Schools' Environment area and send out a further 30 buckets, along with instruction letters, to the participants who were asked to record all the creepy crawlies (whether beetles or not) found in them on 16th April, 16th May and 16th June.



The questions the students came up with were, 'do the beetles like to breed in these buckets?' and 'is there a 'best place' to bury the buckets?'

The project is still going strong, with all the participants from the bucket-burying project now being asked to dig up their buckets and find evidence of stag beetle grubs.

Unfortunately no one has yet found any stag beetle eggs or grubs, but they have learnt a lot about the type of creatures to be found in each habitat. The results were shared with all the participants.

Anne is hoping to set up a webcam to see if any beetles are emerging from their own log-piles when no-one's at school. These webcam pictures will be shared with the Borough Sustainability Co-ordinator and to help a wider science community network through a possible '[Science Across The World](#)' project.

Deborah now plans to include the students' monitoring studies in her thesis, especially on the work with the buckets – the techniques of which the children have almost as much expertise as Deborah.

Anne tells Planet Science, "*One benefit to the children is the awareness of an endangered species, not 'out there in the jungle', but 'right here in our back yard'.*

*Another benefit is that some children become really engrossed by the beetles, making up little research experiments at home and writing up projects themselves, without being asked to, but because they have found something to inspire them. This, for me, is priceless."*

## Anne and Gatsby

Anne is also a Gatsby Teacher Fellow. Gatsby Fellowships allow teachers to develop new curriculum materials. Find out more about being a Gatsby Fellow in the Real Science feature about the Teacher Scientist Network. Although the Stag Beetles project was generously supported by the Royal Society, the Gatsby project was what initially got Anne thinking about inspiring her colleagues and students with how wonderful science is.

She used her Gatsby Fellowship to produce a box of 'off the peg' practical science lessons for non-specialists. The boxes were fully equipped with everything needed to cover a science class with an unfamiliar year group and at short notice. Anne did this because she knew teachers may be hesitant to teach any science they are not too sure about.

The stag beetle project provided an extra dimension of interest throughout the whole school and raised the profile of science - everyone became a beetle hunter!

Anne also encourages other teachers to apply for these schemes since the support from both organisations is so motivating. At Herries School they also use [BA Young Investigators](#) materials in their science club, which really gets the kids wanting to do science investigations. Anne says, *"It is very exciting to see children become genuinely interested in science and not just in it to pass exams."*

## More on the mighty stag beetle...

The stag beetle is Britain's largest beetle, but there aren't that many all over Europe. Somewhat counter-intuitively there are more in London than anywhere else in Britain. [The London Wildlife Trust](#) has set up the London Stag Beetle Hunt funded by the Heritage Lottery Fund to get more information about where the stag beetles are: are they flying across your garden, under some huge stones in your park, or wandering around your playground?

The Trust is collecting any data on the beetles i.e. whether you see dead ones or the absence of where you had seen them in previous years. This all helps to build a record of how the stag beetles are spread across the London region.

They also want to know if you've seen one outside of London, [get in touch!](#)

Stag Fact: stag beetles have strong body armour, and even though they can be killed on roads and by being trodden on, one of them has managed to survive being run over by a lawnmower.

Check out the [UKSafari](#) site for more details on the life and times of Mr (or Mrs) Stag Beetle.

## It's a bug's life...

Following on from talk about stag beetles, remember National Insect Week happens every year in the third week of June. Everyone can join in the fun of pond-dipping, entering a photo competition and counting ladybirds.

It's the ideal piece of insect research, where anyone can take part, all ages, all abilities, and at all times. [National Insect Week](#) is an initiative of the [Royal Entomological Society](#) (of which Charles Darwin was a Fellow).



The project allowed students to actively interact with scientists and as a result, this raised the profile of science within the school. The students have a better understanding of food webs and aquatic ecosystems, and it wasn't all about scientific skills.

Their designing and entrepreneurial skills were called into play. Some pupils constructed frog-friendly shelters ('frog flats') to investigate if frogs used them, and also to investigate if population density affects the rate of development of tadpoles.



## Pond Life...

Drs Genoveva Esteban, Chris Reading and Gabriela Jofre are inspiring pupils to pester a pond population. Based at the [Centre for Ecology and Hydrology \(CEH\)](#), Dorset, these scientists are working with Year 4, 7 and 8 pupils, and their science teacher, Charlotte Sharp, at Dumpton Preparatory School in Wimborne with their Partnership Grant.

In 2004, two ponds were constructed in the woodland area of the school, and as part of an Environmental Science course, the older students built paths to the ponds, making them more accessible to their younger friends. Now that everyone could get to the ponds, it was time to get experimenting.

Students were naturally quite inquisitive about the ponds and the aquatic life within them. So it didn't take much to get them using sampling techniques, recording animal species and cataloguing them to understand more about habitat requirements.

These pupils knew about protozoa too. 'Protozoa' is a term used to talk about microscopic single-celled organisms (not bacteria), but most students would only learn this at A-level. These children weren't fazed. They had developed their microscope skills, manufactured ingenious foam traps to 'catch' protozoa and other small organisms. Students also learnt sterile techniques to take samples of pond shore sediments.

Dr Esteban tells Planet Science that the students literally all screamed out 'WOW' when they saw the microbes actively moving around in drops of pond water under the microscope. Well, in answer to that, all Planet Science can say is also 'WOW'!

All students involved got the chance to really enhance their ICT skills too. For example, they learnt microphotography using special equipment at the CEH, and then used the images to make educational posters, notelets and calendars for the school. Surely there's a money-making initiative in there somewhere?

## Get ready to rumble

Chris Chapman, a retired physicist with an interest in seismology, has been working in partnership with Stewart Bullen who teaches at [Haileyhall School](#) in Hertfordshire to find out more about why the earth rumbles i.e. when there are earthquakes, erupting volcanoes, tsunamis and so on.

You'd imagine it's not the easiest subject to teach in schools in the UK from a practical perspective, what with being on an island, and situated away from major tectonic plates. But that's where you'd be wrong.



The Mediterranean region, southern Portugal and Spain, the Pyrenees, the Alps, Italy, Greece, Turkey and the north coast of the African Continent are all quite active and quite close.

Although the UK is seismically fairly 'quiet', earthquakes from these other regions can be detected, as well as other earth-shaking events.

Haileyhall School saw a huge trace on their seismograph when the Buncefield fuel depot at Hemel Hempstead exploded.

A seismograph is a machine which picks up seismic signals (you've seen one probably, squiggly lines drawn with a pen moving up and down, a bit like an earth ECG) and the record you get is a seismogram.

By studying the seismogram, students can measure how far away the earthquake was and also estimate it's strength. But they'll

have no idea of the epicentre (origin of the earthquake). To do this they need to have recordings from at least two other seismographs in other parts of the country, maybe from other cooperating schools with on-line seismometers. See

<http://www.scieds.com/spinet/>

Students can look up larger quakes on <http://www.iris.edu/seismon/>

But school seismology isn't just about recording these natural disasters. For large quakes, the initial damage analysis, the progress of emergency relief, foreign aid and eventual recovery can all be followed from reports on the internet. These may be related to the local geography, geology, agriculture, local constructional resources, the re-establishment of road and rail links, water and drainage supplies. Many foreign catastrophies are also reported in languages other than English, Spanish being common!

Students can now experience 'real live science in school' on a day to day basis, maybe adding significantly to their CVs and also relate in direct humanitarian ways to what is going on in other parts of the world.

Thanks to their Royal Society Partnership Grant and the help of the British Geological Survey they're working on a project to develop a seismometer suitable for use in schools, and getting students inspired to learn more about the earth's activities, and contribute to the ongoing database of seismic signals. This is real world-wide science coming into the classroom. Look at the [SciEds web site](#) for more information on educational seismology. The Royal Society gives out grants to a variety of projects and to schools all over the country.

## Other eye-catching projects include:

Students from Thornhill College, Londonderry looked into renewable energy generation i.e. wind energy and solar heating. They aim to make a final presentation to their local government.

Resistant and Blight-susceptible tomato plants were investigated by pupils from Prince Henry's Grammar School in West Yorkshire in an attempt to really understand how they could help combat this devastating plant disease.

Mr Kirk Sargent and pupils at Redbridge College, Essex studied the ecology of the water vole in the inner Thames Marshes. They've been looking at ways to stop cattle poaching river banks (voles' homes) but still allow them access to water.

If you've been inspired by any of these ideas and you'd like to know more about the Royal Society Partnership Grants Scheme see the links below.



### LINKS

Royal Society Partnership Grants

<http://www.royalsoc.ac.uk/page.asp?id=1948>

Royal Entomological Society

<http://www.royalensoc.co.uk>

National Insect Week Info

<http://www.nationalinsectweek.co.uk>

Herries School environment projects

<http://www.herries.ws/environment.htm>

Science Across the World project

<http://www.scienceacross.org/>

BA Young Investigators

<http://www.the-ba.net/the-ba/ResourcesforLearning/>

Stag Beetle Research Site, London Wildlife.

[http://www.wildlondon.org.uk/stag\\_beetle.php](http://www.wildlondon.org.uk/stag_beetle.php)

UK Safari Stag Beetle Info

<http://www.uksafari.com/stagbeetles.htm>

National Stag Beetle Hunt

<http://www.greatstaghunt.org/>

Educational seismology

<http://www.scieds.com/spinet/>